CONCHA HEADSET STABILIZER

Background of the Invention

Field of Invention

The invention relates generally to the design of headsets, and more particularly, to an apparatus for stabilizing such headsets.

Description of the Background Art

A concha style headset is a device for transmitting received sounds to the ear of the user by means of a small receiver which is sized to fit in the lower concha in front of the ear canal. In telecommunication headsets, a tubular extension or a voice tube is often coupled to the receiver and extends down and towards the user's mouth for receiving the user's voice and transmitting it over a telecommunications line. Conventional earbud concha style headsets position the receiver inside the lower concha between the tragus and anti-tragus to establish placement and support on the ear. However, different ear shapes and sizes make it difficult for a single design to both fit the ear correctly and to stabilize the headset. Accordingly, the receiver is typically held in place by mechanical devices which fit around the outside of the ear, or around the head. These devices add mechanical complexity, which decreases ease of use, and increases the cost of manufacturing. Mechanical stabilizers also increase the size and weight of the headset, resulting in increased fatigue from prolonged use.

One example of such mechanical stabilizers is the ear hook. An ear hook is a large semicircular component that fits around the top of the ear between the helix and the side of the head. The receiver is then attached to the body of the ear hook, and held in the lower concha in front of the ear canal, or it can be coupled to the receiver with a flexible tube and placed into the lower concha. The ear hook presents three

disadvantages. First, an ear hook is awkward and time consuming to place on the ear because of the need to manually position the ear hook. Second, the ear hook does not ensure that the receiver stays in front of the ear canal, resulting in the user having to periodically readjust the ear hook or receiver during usage to correct the placement. Finally, the ear hook requires additional mechanical parts, such as those for adjusting for left and right ears, and different ear sizes. The ear hook and such parts add weight to the headset, increasing fatigue during use, and increasing manufacturing and product costs.

Another common alternative is a headband style headset that locates the receiver in front of the ear canal using a stiff metal band which arches over the top of the head from ear to ear. The headband adds weight and mechanical complexity to the headset, requires both hands to put on and take off, and can take some time to adjust properly.

It would be desirable therefore, to provide an apparatus for stabilizing a concha headset that overcomes the disadvantages of the prior art. In particular, it is desirable to provide a means for stabilizing the headset that adds little weight or mechanical complexity to the headset, thereby reducing manufacturing costs, and increasing usability, and adaptability to existing headsets.

Summary of Invention

A stabilizer for a headset comprises a receiver attachment which couples to the receiver, and a concha stabilizer pad which is secured to the receiver attachment by a flexible supporting member. The concha stabilizer pad engages the upper concha below the antihelix when the receiver is placed in the lower concha between the tragus and antitragus, thereby creating three points of contact at the tragus, the anti-tragus, and the upper concha.

One embodiment of the stabilizer comprises a shaped foam piece which couples onto the receiver of a headset. A portion of the foam piece forms an ear cushion that

covers the receiver, and fits between the tragus and the antitragus. Another portion of the foam piece forms a supporting foam member that extends from the top of the ear cushion to a concha stabilizer pad that rests against the upper concha. The supporting member is elongated and flexible, providing a spring hinge-like action which automatically adjusts the stabilizer to the size and shape of the upper concha, while providing sufficient force to hold the receiver against the lower concha.

Alternatively, the stabilizer is formed from an arch that connects to a receiver, and is disposed upward from the receiver. A concha stabilizer pad is secured to the top of the arch and provides a contact point when inserted into the upper concha. The arch is resilient to provide tension to the upper concha through the foam pad, thereby stabilizing the receiver in the ear. The resilient arch can be formed of wire, an elastomeric compound, or the like. In another alternate embodiment the stabilizer is formed as a torus (ring shape) that is coupled to a stalk shaped supporting member.

The simple design and absence of mechanical parts results in several benefits. The concha stabilizer permits fast and easy one-handed insertion and removal, without the need for repeated adjustment. The concha stabilizer maintains the receiver in the lower concha, ensuring proper placement and eliminating the need for frequent readjustment. The concha stabilizer is self-adjusting with no additional mechanical parts, and is symmetrical for either ear. The small form factor increases wearability, and decreases fatigue. Further, manufacturing costs are also reduced. The design of the concha stabilizer is readily adaptable and applicable to a variety of existing headsets which use an ear cushion, thereby allowing use of the present invention with no need for redesign.

Brief Description of the Drawings

~~Figure 1 is an illustration of the concha stabilizer, with Figure 1B showing a sectional view of the concha stabilizer of Figure 1A.~~

Figure 2A, 2B, and 2C are illustrations of alternate embodiments of a concha stabilizer.

Figure 3 is a pictorial illustration of the human ear, as described in the Appendix.

Description of the Preferred Embodiment

The present invention for stabilizing a concha style headset includes a receiver attachment that couples to the receiver, a flexible stabilizer support member that couples to the receiver attachment and extends away from the receiver attachment and toward the upper concha with the receiver placed in the ear, and a concha stabilizer pad mounted at the end or top of the support member, for contacting the upper concha below the antihelix.

Figure 1 shows an embodiment of the invention for stabilizing a concha style headset typically including a receiver **27** and a voice tube **30**. A receiver attachment comprises an ear cushion **11** preferably dimensioned as an oblate spheroid, formed of a reticulated, fully open-pore flexible, ester type polyurethane foam. A suitable foam is the P100 foam commercially available from Illbruck Inc.. The foam has a density of approximately 1.75 lbs/ft^3, provides a minimum restriction to air flow, and is functionally transparent to the transmission of sound from the receiver **27**. The ear cushion **11** has an open central recessed portion **13** forming a "C" shape, which is dimensioned to fit snugly onto the receiver **27**. When placed into the lower concha **41** (Figure 3), the ear cushion **11** contacts the tragus **35** and the antitragus **39** at a tragus contact point **23** and an antitragus contact point **25**, respectively, where the face **15** of the ear cushion **11** rests in the lower concha **41** and faces toward the ear canal **33**. The left/right orientation of the tragus contact point **23** and the antitragus contact point **25** with respect to the face **15** of the ear cushion **11** is reversed for the left and right ears.

Extending from the upper surface of the ear cushion **11** is a flexible support member, here a stabilizer support **17**. The stabilizer support **17** is an open cell foam which has been compressed to become sufficiently rigid to provide both flexibility for, and resistance to, positional deformation. The foam can be the same as that used for the

ear cushion, ~~compressed~~ compressed approximately 1.74:1 using ~~conventional~~ conventional techniques, yielding an approximate effective density of 9.29 lbs/ft^3. The end of the stabilizer support **17** is coupled to a concha stabilizer pad **21** which contacts the upper concha **43** beneath the antihelix **45**. ~~The concha stabilizer pad 21 is formed of the same compressed open cell foam as the stabilizer support 17.~~ The stabilizer support **17** can have a uniform width or can taper from the ear cushion **11** toward the concha stabilizer pad **21**. Two support ribs **19** are disposed longitudinally along the inner surface of the stabilizer support **17** and extend from the upper surface of the ear cushion **11** to the underside of the concha stabilizer pad **21** to increase the rigidity and durability of the stabilizer support **17**. The longitudinal axis of stabilizer support **17** aligns with the longitudinal axis of the voice tube **30**. The stabilizer support **17** can be formed out of non-compressed open cell foam if the foam is overmolded to a more rigid material like wire or plastic.

During use, the ear cushion **11** is placed into the lower concha **41**, fitting into the intertragic notch **37** between the tragus **35** and the antitragus **39**, with the contact points **23, 25** respectively engaged. The user then pushes the stabilizer support **17** into and against the upper concha **43**, below the antihelix **45**. The outer surface of the concha stabilizer pad **21** provides a concha contact point **24** which contacts the upper concha **43**, thereby providing three points of contact for stabilizing the ear cushion **11**. The placement action causes the stabilizer support **17** to form a hinge point **28** where the underside of the concha stabilizer pad **21** joins the support rib **19**. The cellular foam of the stabilizer support **17** gives the hinge point **28** sufficient angular tension to maintain the concha contact point **24** against the surface of the upper concha **43**. The degree of angular flexure of the hinge point **28** is dependent upon the size and shape of the user's ear, particularly the upper concha **43**, antihelix **45**, and the crux of the helix **31**. The hinge action of the hinge point **28**, coupled with the general flexibility and resilience of the stabilizer support **17**, allows the stabilizer support **17** to automatically adjust to the

size and shape of ~~the~~ the user's upper concha **43**, ~~without~~ without any additional mechanical devices, to properly position the concha stabilizer pad **21**.

Figures 2A, 2B, and 2C show three alternative embodiments of the present invention. In all embodiments, the receiver attachment is integral with the support member, and is coupled to a concha stabilizer pad. In the embodiment of Figure 2A the receiver attachment comprises curved members **51a** which are dimensioned to curve around the body of the receiver **27**. The curved members **51a** have retaining members **53a** which engage the underside of the receiver **27** in holes adapted to receive such retaining members **53a**, thereby securing the curved members **51a** to the receiver **27**. Integral with, and coupling between the curved members **51a**, is a curved support arch **55a** which extends upwards and away from the receiver **27**. The top portion **59a** of the support arch **55a** is coupled to a concha stabilizer pad **57a**, which functions as described above.

Figure 2B shows another alternative embodiment in which the receiver attachment is formed with only retaining members **53b** for mounting in holes in the upper surface of the receiver **27** adapted to receive such retaining members **53b**. Integral with, and coupling between the retaining members **53b**, is a curved support arch **55b** which extends upward and away from the receiver **27**. The top portion **59b** of the support arch **55b** is coupled to a concha stabilizer pad **57b**, which functions as described above.

In the embodiments of Figures 2A and 2B the support arch **55** provides the support for the concha stabilizer pad **57**, and provides sufficient tension to maintain the concha stabilizer pad **57** against the upper concha **43** during use. In these embodiments the arch **55** and its integral portions **59** and members **53, 55** can be formed of wire, an elastomeric compound, or the like.

Figure 2C ~~shows~~ shows another alternative ~~embodiment~~ embodiment in which the receiver attachment comprises the end portion **53c** of a compressed foam support stalk **55c**, which can be also made of a rigid plastic material. Along the length of the support stalk **55c** are support ribs **61c** which increase the rigidity and durability of the support stalk **55c**. The end portion **53c** is inserted into a hole in the upper surface of the receiver **27** dimensioned to receiver the support stalk **55c**. At the opposing end of the support stalk **55c** is coupled a toriod shaped concha stabilizer pad **57c** formed of open cell foam, of the type described above. The toriod shape of the concha stabilizer pad **57c** enables the pad to deform and adapt to the shape of the upper concha, thereby maintaining the receiver in position.

The spirit and scope of the invention is not intended to be limited to the description of the preferred embodiment herein, but is capable of use in other environments or combinations, and is capable of modification or changes within the details of the inventive concept described above. The invention can be used with any concha style headset receiver coupled to any audio source. The headset stabilizer can be used with any headset for personal listening to any audio source device. For example, the invention can be used with headsets typically employed for listening to music, and particularly to headsets used with portable cassette. compact disk players. radios. Accordingly, the invention is limited only by the claims included herein.